

WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and
second crystallizing the semiconductor film comprising silicon in an atmosphere comprising hydrogen.
2. A method according to claim 1, wherein the semiconductor film comprising silicon has a thickness of 1500 Å or less.
3. A method according to claim 1, wherein a catalyst element comprising nickel is used in the crystallizing steps.
4. A method according to claim 1, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.
5. A method according to claim 1, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.
6. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and
second crystallizing the semiconductor film comprising silicon in an atmosphere comprising nitrogen.
7. A method according to claim 6, wherein the semiconductor film comprising silicon has a thickness of 1500 Å or less.

8. A method according to claim 6, wherein a catalyst element comprising nickel is used in the crystallizing steps.

9. A method according to claim 6, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.

10. A method according to claim 6, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.

11. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and
second crystallizing the semiconductor film comprising silicon in an atmosphere comprising hydrogen,
wherein each of the first and the second crystallizing steps is conducted at a temperature between 500 and 800°C.

12. A method according to claim 11, wherein the semiconductor film comprising silicon has a thickness of 1500 Å or less.

13. A method according to claim 11, wherein a catalyst element comprising nickel is used in the crystallizing steps.

14. A method according to claim 11, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.

15. A method according to claim 11, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.

16. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and
second crystallizing the semiconductor film comprising silicon in an atmosphere comprising nitrogen,
wherein each of the first and the second crystallizing steps is conducted at a temperature between 500 and 800 °C.

17. A method according to claim 16, wherein the semiconductor film comprising silicon has a thickness of 1500Å or less.

18. A method according to claim 16, wherein a catalyst element comprising nickel is used in the crystallizing steps.

19. A method according to claim 16, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.

20. A method according to claim 16, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.

21. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
selectively forming a cover film over the semiconductor film comprising silicon;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and

second crystallizing the semiconductor film comprising silicon in an atmosphere comprising hydrogen.

22. A method according to claim 21, wherein the semiconductor film comprising silicon has a thickness of 1500 Å or less.

23. A method according to claim 21, wherein a catalyst element comprising nickel is used in the crystallizing steps.

24. A method according to claim 21, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.

25. A method according to claim 21, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.

26. A method according to claim 21, wherein the cover film comprises silicon oxide.

27. A method according to claim 21, wherein the cover film comprises silicon nitride.

28. A method of manufacturing a semiconductor device comprising the steps of:
forming a semiconductor film comprising silicon over a substrate;
selectively forming a cover film over the semiconductor film comprising silicon;
first crystallizing the semiconductor film comprising silicon in an atmosphere comprising oxygen; and
second crystallizing the semiconductor film comprising silicon in an atmosphere comprising nitrogen.

29. A method according to claim 28, wherein the semiconductor film comprising silicon has a thickness of 1500 Å or less.

30. A method according to claim 28, wherein a catalyst element comprising nickel is used in the crystallizing steps.

31. A method according to claim 28, wherein each of the first and the second crystallizing steps is conducted by a heat treatment.

32. A method according to claim 28, further comprising a step of treating the semiconductor film comprising silicon in a hydrochloric acid or a hydrofluoric acid after the second crystallizing step.

33. A method according to claim 28, wherein the cover film comprises silicon oxide.

34. A method according to claim 28, wherein the cover film comprises silicon nitride.